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IN THE USSR
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THE PRESENT ORGANIZATION OF GEOGRAPHICAL SCIENCES
IN THE USSR*

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In every country where science plays a large role in the life of the society, the organization of such sciences as physics, chemistry, mathematics, biology, history, geography, etc., has been adequately defined. Each organization consists of numerous subdivisions. When, for example, we say biology we have in mind such sciences as anthropology, human physiology, botany, zoology, microbiology, hydrobiology, biochemistry, biogeochemistry, histology and many others. The same applies to geography: it is also so differentiated that in its "general sphere" dozens of different subdivisions are included, many of which are quite important by themselves. The organization of such sciences as physical, chemical, biological, geographical, etc., usually takes place in its own fashion in each of the major countries in connection with their historical characteristics, different practical needs, scientific traditions, etc. This paper describes the organization of geographical sciences up to modern times in the Soviet Union, with an evaluation of its prospective development.

The first question which arises in the determination of the organization of geographical sciences is: does geography as such have a place in this organization? Or, perhaps, has the mighty root from which came so many shoots already ceased to exist, yielding place to the young thick sprouts? Is perhaps the term "geography" now a convention designating only a form of combination of a number of sciences?

Organizations of geographical sciences would not exist

* Reported at the 1959 Lomonosovskiy lectures

if in this organization there were no geography proper - the science of territorial variation and development of the geographical environment of human society. Contemporary geography is primarily concerned with the ever increasing role of productive forces in the development and variation of the geographical environment, with the exchange of materials between productive forces and the geographical surroundings, with the resources of the geographical environment and their use by society for the development of productive forces and the transformation and future of the geographical environment. The present geographical environment of human society is all of the earth's surface with its oceans and seas, mineral resources, atmosphere, all organic life, and those changes and material-technical bases which human society has created on the earth. The geographical environment is not just the locations where modern life and contemporary economy are taking place; now all of the earth's surface has been measured, filmed and plotted on maps for present and future human needs. The cycle of substances in the geographical environment is also included; increasing every hour, the exchange of materials between the productive forces of society and the geographical environment includes now - through its interrelated members - the whole surface of the earth also including those areas which are as yet uninhabited by humans. At present impassable dense forests of Siberia determine the flow of rivers upon which are standing or being built dams for the hydroelectric stations of large electrical plants. The head from these dams often reaches the most uninhabited locations. Combustion of coal, petroleum and other types of fuel increases the carbon dioxide content of the atmosphere, affecting its cycle on the earth. Hains transfer salts and radioactive substances from inhabited to uninhabited locations and also vice versa. Consequently it is presently already impossible to distinguish sharply in the geographical environment inhabited regions from uninhabited regions in the same area since they are quite closely connected with each other by the universal cycle of substances.

The geographical environment is the particular "realm" of the terrestrial globe which includes the lithosphere, hydrosphere, atmosphere and biosphere and is distinguished by the presence of the most intense interaction of all the elements of nature, an intensity of such a degree that the interaction creates a totally new and particular quality. Finally, only in the geographical environment does man, a new factor of cosmic importance, live, work, change the environment and imperiously interfere with the cycle of substances. Human labor and its results are inseparable from the geographical

environment: from the early Roman roads and bridges which are even in use today in France, and the desert sands packed down long ago by innumerable cattle going to pasture, to the irrigated rice fields extending up the mountain slopes, navigable canals, mines, pits, open quarries and gigantic coal works, gas mains, high voltage electrical transmission lines, cities with their stone facade, ultrasonics dispersing clouds, deep wells, etc. All this material-technical base of society has been created by human labor from natural materials in the geographical environment, with the aid of natural laws; the material-technical base has altered nature, added to the complexity of the development of the geographical environment, made it far more varied, generous, and productive. Without productive forces from human society this particular quality of the geographical environment would vanish. This situation was vividly expressed by N. S. Shatskiy when he said at a conference "I cannot conceive of a geography without man."

In 1930-1940 the very concept of the possibility of the existence of geography as a science of the geographical environment of human society was considered "bourgeois" by a number of Soviet scientists. They claimed it then was a "mixture of the laws of the natural and social order." In order to study the geographical environment of human society with all the variations that have been introduced in it by social productivity, it is necessary to use both the natural laws discovered in geology, biology and other natural sciences as well as the laws of society discovered by history, political economy and other social sciences. In practice both these and other laws are used simultaneously by such sciences as anthropology (the biological laws and laws of the history of society), human physiology (and more generally -- all medicine), technical sciences (including agriculture) and others. Dialectical materialism, comprising the foundation of science, prevents just that "mixture of laws", demanding instead that the organization of sciences reflect the complex real activity, the mutual relationship between different phenomena, their mutual congruence, contradictions and conflicts.

The geographical environment, created in its present form by both nature and human labor, is in need of a broad integrated approach to a "unified view". The people use the resources of the geographical environment and alter them, live and work in it, never thinking - to be sure - that they are "mixing" the laws of the natural and the social order; science should go along with the people, reflecting the experience of their labor. It is another matter that the scarecrow of "mixing laws" has accommodated certain men

of a science: thus it is easier - the natural scientist need not learn very thoroughly the laws of social science and can quietly study nature without meditating on its future through the present dizzy pace of changes in nature produced by society, and the economist (or statistician) need not master such complex questions of natural laws, which are usually far removed from his specialty, as the development of soils, climate, plants and especially the geographical environment as a whole. But the simple worker, you know, is obliged to know to a certain extent both this and other things in his allotted tasks. So why cannot and need not science help him in this with a general statement about the question of geographical environment of human society?

Let us now go on to the main subdivisions of geography, each of which should be directed above all toward the illumination and enrichment of our concept about the main object of geography - the geographical environment of human society. However each subdivision has its own special characteristics, tasks and interests. These explain the continuous struggle between the "centripetal" and "centrifugal" tendencies in the geographical system of sciences (as in other scientific systems).

The main subdivisions of geography are physical geography, economic geography and cartography.

Physical geography is the science of natural laws of development and territorial differentiation (types) of geographical environment. Its attention is centered upon the natural cycle of substances for a particular geographical environment.

Physical geography, which is also of independent significance, includes such disciplines as general geography, landscape and physico-geographical study of countries.

General geography studies the general natural laws of formation and further development of the geographical environment.

Landscape studies the formation, development and typology of the numerous natural complexes of various types (natural landscapes) which together comprise the natural base of the geographical environment. Landscapes are sections of the earth's surface which differ qualitatively from other sections, possessing natural boundaries and each being an integral and mutually dependent - i. e. regular aggregate of features and phenomena.

The physico-geographical study of countries characterizes the geographical environment and natural resources of countries and large regions, primarily natural but also economic.

General geography contains the most subdivisions, which include the sciences listed below.

Paleogeography, which studies the history of the development of the contemporary nature of the earth's surface until it became the geographical environment of modern human society.

Geomorphology, which is the science of the origin and contemporary development of the relief of the earth's surface in relation to the development of the entire geographical environment.

Climatology, which is the science of contemporary climates of the terrestrial globe and climate-forming processes (such as combinations of cycles of substances on the earth) which reflect the effect of solar energy and other cosmic factors upon the earth's surface. Paleoclimatology studies climates of the past. The effect of different climates on the development of different crops and their combinations is the topic of agroclimatology.

The hydrology of dry land studies various forms of water on the surface of dry land (lakes, rivers, reservoirs, ponds, etc.) and their movement (flow) as one of the most important elements in the cycle of substances on the earth, the transfer of suspended and dissolved matter by water and the water resources of productive forces. Hydrochemistry is related to hydrology in that the former studies in particular the chemical content of waters, its relationship to the surrounding environment and the transfer (migration) of salts and other chemical compounds during the moisture cycle in the geographical environment. Bordering such sciences as the hydrology of dry land and geomorphology are glaciology (ice science), snow science, frozen ground science (the science of perennial and seasonal freezing of the earth's crust); although these also study waters in their solid state, ice, snow on the earth's surface and ice in the depths of the earth's crust form distinctive types of relief which are studied by geomorphology.

Oceanography characterizes the world ocean and its role as a special form of geographical environment; it studies the place and role of the world ocean in the development of natural cycles of substances (the interrelationship between ocean and sea space with that of dry land), the natural regime of the oceans and seas (currents, salinity, levels, ice conditions, ground deposits) and their resources for the development of productive forces.

Biogeography is the science of the organic part (expecting human beings) of the geographical environment, its development, the role of organisms in the natural cycle of

substances, organic resources for industry and their territorial differentiation (territorial groupings - coenotypes - of the organic world). Coenotypes are studied by a particular branch of biogeography - biogeocoenology which in turn is subdivided into phytocoenology the science of territorial vegetation groups and zoocoenology, the science of territorial groups in the animal world. Branches of phytocoenology which are well-known include such scientific disciplines as the study of types of forests, and marsh science, which border the disciplines of biogeography and hydrology of dry land, and meadow science.

Soil science (viewed as a geographical discipline) is the science of the soil cover of the earth's surface, its formation, development, place in the geographical environment, soil types and variations in their natural and effective fertility.

Besides the geographical view of the soil cover there are also other approaches to the study of soils: agro-soil science, chemistry and microbiology and others. In this respect the investigation of the soil cover, in view of its complexity, may undergo the fate of the investigation of the world ocean, which is studied by both the geographical discipline of oceanography as well as such disciplines as marine physics, marine chemistry, marine geology, marine biology, etc. All of these disciplines form a system of sea sciences - oceanology. In the study of soils it is also necessary to distinguish geographical soil science from the wider general soil science - a system of various soil sciences.

Let us now go over to the disciplines of the economic-geographic series.

Economic geography centers its attention upon the productive forces created by human society. Productive forces have three divisions, consisting of 1) people with their emergent and rapidly developing labor customs and industrial experience; 2) means for production (means for performing labor) 3) areas in which to expend labor.

Productive forces, according to their composition, are studied by many sciences (historical, technical, and others) but their territorial combinations (outside of which the aggregate of productive forces cannot exist) are the subject of economic geography.

Productive forces characterize the relationship of society to nature, consequently it is impossible to examine the territorial combinations of productive forces apart from a concrete geographical environment.

Not to mention the fact that people, who created society with its particular intrinsic laws of development, continue to remain a part of nature and are dependent upon the

surrounding environment (temperatures, waters, atmospheric composition, atmospheric pressure, etc.); historically they formed their working habits and acquired their productive experience in a process of continuous struggle with nature under the concrete conditions of a changing geographical environment. The geographical environment left its strong imprint upon man as well as upon the productive force; man, in turn, changes the geographical environment and the changed environment exerts a new effect upon the working habits and productive experience of people.

The means of production at the present time take on such a material form of existence that it is possible to replace human labor in industry with natural forces by wide application and calculation of the laws of nature. The laws of the development of contemporary technology (which create and use means of labor) are supported by the objective laws of the development of nature, and by the laws of natural science. V. I. Lenin wrote in "Filosofskiye Tetrady (Philosophical Notebooks)":*

"The laws of the outer world, nature, can be subdivided into mechanical and chemical (this is quite important), and are the foundations of expedient human activity.

Man in his practical activity has before him an objective world, he depends upon it and it determines his activity.

From this aspect, the aspect of practical (goal-directed) activity of man, the mechanical (and chemical) bases of the world (nature) are, as it were, something external, secondary, and separate....

Mechanical and chemical technology consequently also serve the purposes of man in that their character (essence) consists of determinations of his external conditions (the laws of nature)....

...In fact the goals of man are results of the objective world and they direct him and locate him as a given quantity. But it seems to man that his goals are chosen independently and without external influence ("freedom")."

The means of production thus are inseparable from surrounding nature; they depend upon its laws and, besides, must be adaptable to the concrete conditions of the geographical environment.

Areas in which to expend labor are selected directly by man from his surrounding geographical environment; he wrests them out of various natural complexes - combined together with other entities - and again inserts them in

* V. I. Lenin. "Soch." (Works), Vol. 38, pages 178-180

changed form into the geographical environment as material-technical bases for production.

Areas in which to expend labor must now be understood in a wider sense than formerly; included now are solar energy, which transforms not just plants but also thermo electric batteries, air (nitrogen, oxygen and other gases which are separated and used in industry), water (salts are obtained from ocean water; heavy water, which is found in ocean water, is a future source of thermonuclear energy; fresh water is used by many branches of industry and agriculture) and other natural items. The increased number and complexity of objects on which to expend labor, which are found in contemporary industry, has strengthened the relationship of productive forces to the geographical environment. At the present time whole territorial natural complexes (landscapes in agriculture, useful mineral complexes in industry, forest types in the lumber industry, etc.,) have become objects on which to expend labor. To a certain extent, with the development of technology and the growth of mankind, all the geographical environment (more exactly, its greater part) is becoming the general object on which to expend labor. The increasing complexity of development of productive forces is leading to this.

Contemporary science looks far ahead. In the distribution of industry, agriculture, transportation, cities, in planning the development and territorial structure of productive forces it is obligatory to know the natural resources, i. e., the areas in which to expend labor of future, potential productive forces (they are often called natural productive forces). Natural resources of the geographical environment are the future productive forces (objects of labor) of society; this is still an important "formula" of the relationship of physical to economic geography.

In such a fashion - although it is not possible to equate productive forces to the geographical environment exactly - their interpenetration is quite great and theoretically explainable. The relationship of economic geography to a number of geographical sciences is especially founded on this interpenetration ("exchange of materials").

The relationship of people to nature has historically always determined by the social system. For this reason the interpenetration of productive forces with the geographical environment can be understood by using the laws of development of society. While remaining a geographical science, economic geography uses laws discovered by history, political economy, socio-economic statistics, history of technology and other social sciences in order to explain the development

and territorial combinations of all three elements of productive forces and mainly to disclose the regularities in the mutual relationships of these complexes during the process of territorial division of labor.

And so, economic geography is the science of territorial combinations (complexes, structure and organization) of productive forces, which arise during the process of mastering the geographical environment and during the development of territorial division of social labor.

If physical geography centers its attention upon the natural cycle of substances, then economic geography studies the inclusion of production in this cycle; the exchange of materials between productive forces and the geographical environment and the exchange of products of production between various territorial combinations of productive forces (structures, complexes such as countries, regions, centers, cities and their suburban zones, etc.), i. e., the territorial division of social labor.

Economic geography is subdivided into general economic geography (the study of territorial complexes of productive forces) and the economic-geographic study of countries.

General economic geography studies the laws of formation and development of territorial complexes of productive forces of various types and sizes and their mutual relationships, expressed by the territorial division of social labor among them. A particular feature of this division is the study of economic division into districts, which is based upon the separation of territorial complexes of productive forces and which characterizes the paths of their development and their mutual relationships during the process of territorial division of social labor; a point of origin of this study is the analysis of all the production of the country.

General economic geography, in its turn, includes a number of important subdivisions.

Historico-economic geography - the science of past territorial combinations of productive forces and the past development of territorial division of social labor.

Geography of power engineering studies the use of energy resources of the geographical environment in territorial complexes of productive forces and the role of the energy economy in their development, typology and mutual relationships.

Geography of industry is the science of territorial industrial complexes of various sizes (industrial regions, groups, centers) both as a whole as well as large branches of industry, their development, typology and mutual relationships.

Agricultural geography is the science based on the division of agricultural regions and territorial types of agriculture of different size (within the boundaries of a country, its largest economic regions, districts, etc.,); it characterizes their development and relationship both with other facets of the economy (labor resources, industry, cities transportation) as well as with each other.

The geography of transportation studies transportation as an element of territorial complexes of productive forces and a means for their mutual relation. It is especially through the aid of transportation that there exists a territorial division of social labor between countries, regions, centers, etc.).

The geography of population is the science studying population as a primary productive force changing the geographical environment, which creates a material-technical base of production in it. Included is a study of the different kinds of settlements for human life - urban and rural. The geography of population is basically subdivided into the geography of cities and the geography of rural populations. To the geography of population should be added also the "geography of facilities" (geography of culture, hygiene, trade, communal economy and other branches which service contemporary human life in various settlements.)

The geography of construction studies construction in territorial complexes of productive forces of various types and sizes (regions, centers, cities, etc.), the role of the construction to the geographical (natural resources and construction conditions; changes in the geographical environment during and as a result of construction).

Economic-geographic study of countries characterizes the productive forces, economy, internal differences and separate centers of the countries and their largest economic regions. Depending upon the types of countries, the economic geographic study of countries has the following subdivisions: economic geography of the socialist countries; economic geography of the capitalist countries - of the metropolises and their colonies; economic geography of countries freeing themselves from colonialism.

Finally, the third group of geographical sciences is cartography with its subdivisions.

Cartography is the science of the geographical map as a true and complete representation of the geographical environment and productive forces, its main points, elements, types and also the science of methods and processes for creation, reproduction and practical application of the map.

Cartography is subdivided into a number of disciplines

2, page 114.

Mathematic cartography and cartometry (studies methods of different measurements on a prepared map).

Map science and historical cartography (the object of study is the map as a product and means of labor of a certain era, its main points, elements and types).

Composition, editing and publication of geographical maps.

Special forms of cartography (economic, geomorphological, soil, oceanographic, etc.,) are studied by disciplines which are found in the corresponding geographical sciences. For example, economic cartography is a science in the economic-geographical cycle, geomorphological cartography is a part of geomorphology, etc.

In order to enumerate all the subdivisions of geographical science systems that have developed from one root - geography as the science of the geographical environment of human society - we will investigate the geographical sciences included in some of these subdivisions.

First of all is the history of geography, which discloses the history of the development of scientific geographic ideas in the background of human history, the development of productive forces and changes in the geographical environment. Affiliated with the history of geography is toponomy, the science of the origin of geographical names.

Among such synthetic geographical sciences it is necessary to name also the study of countries (combining physico-geographical and economic-geographical study of countries and data on history, ethnography, economics, art, technology, etc. for purposes of portraying integral characteristics of the countries. The characteristics found in the study of countries may relate not only to the country as a whole but also to its parts which possess clearly defined national or historico-geographical peculiarities (for example, in the USSR - republics of the union and autonomous republics and other national territories or such parts of countries as Distant Siberia, Siberia, the Far East, etc.).

The quite young geographical evaluational sciences are also synthetic; these may be combined under the general heading of the geography of natural resources or natural applications. Affiliated with them are: economic evaluation of complexes of useful mineral resources, underground waters, including hot waters and natural steam, etc., economic evaluation of forest resources, hydroclimatic resources and conditions, the complex of resources of the world ocean, soil evaluation, etc.

The necessity for this kind of synthetic geographical sciences of the evaluational type is making itself felt to

a rather strong degree. "Offshoots" of these sciences are already quite noticeable. The evaluational sciences combine the efforts of a number of "branch" geographical sciences: at the present time there has begun to arise discontent with the relative narrowness of these sciences and efforts are being made toward greater breadth, toward the search for new solutions bordering a number of geographical sciences and toward a synthesis of great practical significance. The geography of natural resources may play a large role in the development of geography as a whole, in its approach to life. Such is the contemporary "tree" of systems of systems of geographical sciences in the USSR.

As is apparent from the brief investigation we gave to each of the geographical sciences, they have, without exception, their own material object of investigation which is studied by the geography in the plan of its connection to the whole - the geographical environment of human society. The geographical sciences consider this own particular object both from the point of view of its development and variation as well as from the point of view of its territorial differentiation (typology). Consequently, the classification of geographical sciences as practiced in the USSR has nothing in common with that prevailing in the science of classification in capitalist countries; in the latter each of the geographical sciences occupies only a spatial location in one or another of the groups of topics or phenomena, abandoning the study of their essence to the "systematic" sciences and their development to the historical sciences (according to this classification of sciences, political economy studies the essence of economic phenomena, economic geography studies their spatial location and the history of national economy their historical development).

The system of geographical sciences, just as systems of other sciences, is not isolated. On the contrary, the position of geography at the "junction" of natural, social and technical sciences presupposes its close connection to adjacent sciences. This connection is realized most of all through the "lateral branches" of geography. So, for example, economic geography is quite strongly associated with economic science, being the "frontier" between geography and economics. Geomorphology is a "frontier" of geology, biogeography of biology, climatology of the geophysical sciences of the atmosphere including meteorology, and cartography of geodesy, etc.

"Contiguity" of a number of geographical sciences with neighboring sciences of other systems makes the boundaries of the geographical sciences system diffuse, interpenetration of many geographical sciences with neighboring

natural, social and technical sciences enriches geography and makes it more strong.

At the same time, there is of course, the danger that the "frontier" geographical sciences may become "estranged" from geography and be "drawn into" other scientific systems. This could menace the integrity of the system of geographical sciences, making it loose and indefinite if one considers the fact that if geography does not exist as a whole, then there neither would nor could be anything general to unite the geographical sciences.

The integrity of the system of geographical sciences, united by the study of the geographical environment of human society, makes this system orderly, strong and adds great significance to it for the destiny of mankind, for man's forward progress, for the construction of the new communist society.

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